

REMARKS

Reconsideration and allowance of the present patent application based on the following remarks are respectfully requested.

In the Office Action dated November 28, 2007, the Examiner rejected claims 9 and 10, under 35 U.S.C. §102(b), as allegedly being anticipated by Mamontov '961 (SU 923961); rejected claims 13, 14, 17 and 18, under 35 U.S.C. §102(b), as allegedly being anticipated by Jasim '528 (U.S. Patent No. 5,716,528); and rejected claims 11 and 12, under 35 U.S.C. §103(a), as allegedly being unpatentable over Momontov '961 as applied in claims 9 and 10.

By this Amendment, claims 9-14, 17 and 18 are still presented for examination, of which claims 9 and 13 are independent.

I. Rejections Under §102(b) & §103(a)

As noted above, independent claim 9 is directed to a method of removing organic nitrogen from an aqueous liquid and positively recites, *inter alia*, **adding a nitrosonium ion generator into said aqueous liquid to remove nitrogen from organic-based nitrogen contaminants at a controlled temperature**. These features are amply supported by the embodiments disclosed in the written description.

Applicant respectfully submits that, despite the Examiner's contentions, none of the asserted references, teach or suggest each and every element of claim 9, including the features identified above. In particular, Mamontov '961 discloses a method for the removal of aliphatic amines and/or their salts from waste stream. The method may include (a) adjusting the pH of the waste to pH 2 to 5 with carbonic acid or nitric acid; (b) heating the waste stream with alkali or alkali earth nitrite in the presence of halide ions; and (c) removal of the evolved nitrogen. Mamontov '961 does not specifically disclose **nitrosonium ions, nitrosonium ion generator**, or their roles in nitrogen removal.

Moreover, the method disclosed in Mamontov '961 requires heating the nitrite source in the presence of halide. Heating the nitrite source in the presence of halide suggests that there is a nitrosyl-halide intermediate, which is a very reactive and powerful oxidizing agent for the reaction. In the presence of strong oxidizing agents, such as nitric acid, halide ions may be a cause for environmental concern because of the formation of the organo-halides during the reaction. In contrast, the Applicant's invention is more environmentally friendly as

the reaction of the *nitrosonium ion* (from nitrous acid or acidified nitrite source) with the waste stream does not require the presence of halide ions.

As per the embodiments of Applicant's invention, the method is a simple, single stage process for the nitrogen removal from organic based nitrogen contaminants such as urea, amines, amides and amino acids rather than a multi-stage process as describe in Mamontov '961. Therefore, the method described by Mamontov '961 is totally different from Applicant's method as claimed in claim 9. Thus, for at least these reasons, claim 9 is patentable.

As noted above, independent claim 13 is directed to a method of removing organic or inorganic contaminants from an aqueous liquid and positively recites, *inter alia*, adding a *peroxide in the presence of an activated carbon* catalyst at a controlled pH to oxidise and remove organic and inorganic contaminants, wherein the catalyst is used as a particulate in a fixed bed reactor or moving bed reactor caused by the motion of fluid or gases, or by mechanical means through which the aqueous liquid to be treated comes in continuous contact with the catalyst in the presence of the peroxide. These features are amply supported by the embodiments disclosed in the written description.

Jasim '528 discloses a process for removing organic contaminants from a contaminated water. The process may include oxidizing organic contaminants in waste fluid with hydrogen peroxide in the presence of a catalytic amount of ferrous ions (at an acid pH); adjusting the pH of the oxidized waste water, after completion of the oxidation, to a pH of at least 7 to precipitate the iron catalyst from the contaminated water; and treating with activated carbon to adsorb the residual organic contaminants. Jasim '528 also discloses that the ferrous ions are used as a catalyst in the hydrogen peroxide oxidation reaction, and then, in the final stage, the activated carbon is used to adsorb residual organic contaminants.

In contrast, per the embodiments of Applicant's invention, the contaminants in the water phase are oxidized by hydrogen peroxide, which is catalyzed by activated carbon. This is a single stage process in which the hydrogen peroxide must be present together with the activated carbon, a solid state catalyst for the accelerated oxidation reaction.

As per the embodiments of Applicant's invention, a solid catalyst such as activated carbon is used, and hence the Applicant's invention does not require another precipitation process (such as one described in Jasim '528) to remove the catalyst. Also, the Applicant's invention does not create another waste product, such as iron hydroxide which has to be removed from the water phase before discharging. As activated carbon is also good adsorbent, any oxidation byproduct formed may also be simultaneously removed in the same process

chamber. This simplifies the equipment required for the oxidation process. Therefore, as per the embodiments of Applicant's invention, the presence of any other catalyst, such as metallic ions e.g. iron ions (as the disclosed in Jasim '528) or copper ions, is not necessary for the reaction nor is the presence of such metallic ions detrimental to the process.

Since the primary purpose of the activated carbon in the Applicant's invention is for accelerating the oxidation process, i.e. as a catalyst, the amount of activated carbon used is much lower than that required for a straight absorption process to remove the contaminants.

Furthermore, as per the embodiments of Applicant's invention, the activated carbon catalyzed peroxide oxidation process is effective in both acidic and alkali solution. The pH of the solution in the examples shown in Applicant's invention is far above the effective pH for the oxidation reaction shown in Jasim '528 (for ferrous/ferric ions in solution). Therefore, in contrast to Jasim '528, the Applicant's invention can be used for both organic and inorganic contaminants such as sulfides and cyanides. The wide operating pH range for the activated carbon catalyzed peroxide oxidation process disclosed in the Applicant's invention is advantageous over the process disclosed in Jasim '528.

Applicants must reiterate that the Applicant's invention discloses the usage of activated carbon as a catalyst for hydrogen peroxide oxidation in aqueous liquid. In contrast, Jasim '528 discloses a process that uses hydrogen peroxide in an initial oxidation stage, followed by a subsequent activated carbon adsorption step to remove residual contaminants.

Therefore, the process described by Jasim '528 is totally different from Applicant's process as claimed in claim 13. Thus, for at least these reasons, claim 13 is patentable.

Also, as described in Claim 10 of the current invention, the nitrosonium ion generator used in this current invention may include nitrous acid or in-situ generation with a nitrite and an acid which can be any mineral acid (e.g., sulfuric acid) or organic acid. However any other nitrosonium ion generators such as nitrosonium bisulfate or nitrosonium salts of metal may also be used. Also, hydrogen peroxide is used as the peroxide (oxidant) in the current invention effective as an oxidant over the whole pH range of 0-14, however, other forms of peroxide may also be used in the reaction.

Thus, for at least these reasons, Applicants submit that none of the asserted references are capable of anticipating or rendering claims 9 and 13 unpatentable. As such, claims 9 and 13 are clearly patentable. And, because claims 10-12 depend from claim 9, and claims 14, 17-18 depend from claim 13, claims 10-12, 14, 17, and 18 are patentable at least by virtue of dependency as well as for their additional recitations.

Accordingly, the immediate withdrawal of the rejections under §102(b) is respectfully requested.

II. Conclusion.


All matters having been addressed and in view of the foregoing, Applicant respectfully requests the entry of this Amendment, the Examiner's reconsideration of this application, and the immediate allowance of all pending claims.

Applicant's representative remains ready to assist the Examiner in any way to facilitate and expedite the prosecution of this matter. If any point remains in issue which the Examiner feels may be best resolved through a personal or telephone interview, please contact the undersigned at the telephone number listed below.

Please charge any fees associated with the submission of this paper to Deposit Account Number 033975. The Commissioner for Patents is also authorized to credit any over payments to the above-referenced Deposit Account.

Respectfully submitted,

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